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⁂ *The above List is prepared from the Patent Records by Mr. T. Morgan, Secretary of the Inventors' Patentright Association, Limited.*

HISTORY OF PRINTING.

In an interesting article on printing in China, the *North China Herald* says that the first promoter of the art of printing was Feng Ying Wang, who in 932 A.D. advised the Emperor to have the Confucian classics printed with wooden blocks engraved for the purpose. The first books were printed in a regular manner, and in pursuance of a decree in 953. The mariner's compass and rockets were invented about the same time, showing that at this period men's minds were much stirred toward invention. Twenty years after the edict the blocks of the classics were pronounced ready, and were put on sale. Large-sized editions, which were the only ones printed at first, were soon succeeded by pocket editions. The works printed under the Lung emperors at Hangchow were celebrated for their beauty; those of Western China came next; and those of Fokhien last. Moveable types of copper and lead were tried about the same time; but it was thought that mistakes were more numerous with them, and therefore the fixed blocks were prepared. Paper made from cotton was tried, but it was found so expensive that the bamboo-made paper held its ground. In the Sung dynasty the method was also tried of engraving on soft clay and afterwards hardening it by baking. The separate characters were not thicker than ordinary copper coins. Each of them was, in fact, a seal. An iron plate was prepared with a face of turpentine, wax, and the ashes of burnt paper. Over this was placed an iron frame, in which the clay types were set up until it was full. The whole was then sufficiently heated to melt the wax facing. An iron plate was placed above the types, making them perfectly level, the wax being just soft enough to allow the types to sink into it to the proper depth. This being done, it would be possible to print several hundred or thousand copies with great rapidity. Two forms prepared in this way were ready for the pressman's use, so that when he had done with one he would proceed with another without delay. Here is undoubtedly the principle of the printing press of Europe, although western printers can dispense with a soft wax bed for types, and can obtain a level surface without this device. Perhaps the need of capital to lay in a stock of types. the want of a good type-metal easily cut and sufficiently hard, and the superior beauty of the Chinese characters when carved in wood have prevented the wide employment of the moveable types which are so convenient for all alphabetic writing. The inventor of this mode of printing in moveable types, five centuries before they were invented in Europe, was named Pi Sheng.

Reviews.

POETICAL PORTRAITS AND PATRIOTIC AND OTHER POEMS.

Poetical Portraits of the Good, the Gifted, the Brave, and the Beautiful, and Other Poems. By the Rev. Professor **George Butler Bradshaw**. New Malden, Surrey: The Author.

Dear girls, you'll deem it a very queer theme,
That warns your minds against marriage;
And the more you are warned, the more will be scorn'd
The wretch who would wedlock disparage.
But *I'm* not the man that would blacken or ban
Your right to be wed, or o'erthrow it;
Get buckled this day, *if you can*, but I say,
Dear girls, don't marry a poet!

"Know thyself!" has been regarded as a very necessary and philosophic injunction, and as we cannot after reading the ninety poems contained in the reverend professor's very entertaining volume, presume to exclude him from the class of poets, we can only suppose that his experience (or that of his wife) has taught him the truth that in domestic life the poet is anything but the agreeable, loving, and lovable specimen of humanity which the smoothness and attractiveness of his verses would lead the outer world to conclude; but we may at the same time congratulate him that the suggestive and instructive character of his poems and their ease and melody, whatever may be the style or metre chosen, and these are very various, do not at all support the American's definition of a poet—"an incompetent literary scale maker, a man who sacrifices grammatical accuracy and common sense to produce a regular succession of long and short syllables." The poetical portraits are taken from all classes, from the Queen to the ragged-school boy, and all are equally well drawn and conceived in an equally good spirit. In his patriotic poems the breath of liberality is strong, yet in no case is liberality justified by any advocacy of a repudiation of right and justice. In descriptive poetry the author is particularly at home, one of the finest pieces in the book being without doubt that on "The Wild, Wild West of the Emerald Isle"—an epistle to the fair and good Arabella on the sublime and romantic scenery of the Western Highlands of Ireland, and the social as well as the scenic charms of her native province; in this poem the reader is, moreover, given an admirable account of the fauna, flora, and natural capabilities of the western highlands, and of the habits, faults, and excellences of their humble native inhabitants—once (and up to the commencement of the last few years' anarchy) the most peaceable, kind, and courteous, and still the most witty of the peasantry of the Emerald Isle.

An Irishman, and with experience as a professor in one of the Irish technical colleges, the author has naturally a remedy to offer for the anarchy in his native country; he believes that but for the misguidance of professional agitators, all would be prosperous and happy. He considers that just and impartial laws should be kindly but *firmly* administered for the protection and welfare of all ranks and classes, and of all Churches so far as liberty for the unfettered exercise of their faith and religious duties is concerned; and let the Crown and Sceptre of Great Britain (not the tiara and keys of Rome, nor the mitres and crosiers of either the Protestant or Roman Catholic hierarchy, whether in Ireland or anywhere else) be the only symbols of Great Britain's governing power in Erin for directing and controlling the secular affairs of that country; and peace, prosperity, and loyalty will soon be no strangers in the land. As to Home Rule, he says, that "no patriotic Irishman could object to it if he felt sure it would not lead—*as it speedily might do*—to a sectarian civil war, in which Protestants and Catholics who ought to love each other *as Irishmen*, would speedily engage in mutual slaughter at the first attempt of the numerically dominant Church to crush the other. Throughout the volume the religious pieces are free from sectarianism, although a Protestant and Evangelical spirit pervades them, and the political pieces are so free from party bias that the reader will be at a loss to determine whether the author favours Gladstone or Beaconsfield.

The elegiac, lyrical, amatory, and moral poems all display the same poetical ability, and the same power of adapting the style and metre to the subject under treatment. The volume is likely to please the taste of a large number of readers, and will assuredly add something to Professor Bradshaw's already acknowledged ability as a poet.

EASY TEACHING OF GEOMETRY.

"Lessons on Form for the use of Teachers and Pupils in Elementary Schools." By **Richard P. Wright**, Teacher of Mathematics in University College School, London. Author of "The Elements of Plane Geometry." London: Longmans, Green, and Co.

This work is a most admirable one for teaching what may be justly termed Practical Geometry on Pestalozzi's system; though why this desirable aid to geometrical studies is termed "Lessons on Form," which off-hand would convey notions as to reference to artistic studies, we are at a loss to say. The system, which has long been practised in Holland, Switzerland, and Germany, is no doubt often unconsciously adopted by teachers of elementary classes in English schools, although there are at present no recognised text-books suggestive of the method. Its chief characteristic is to move step by step from the simplest notions to the more advanced geometrical truths.

The lessons are designed for schools where time does not admit of the pupils reading the advanced text-books on Pure Geometry in ordinary use. Notwithstanding their elementary character, they will be found to cover a good deal of ground in that subject. It is moreover hoped, and is in fact intended, that they should be suggestive to teachers of those amplifications which beginners always need in an abstract subject like Geometry.

In a few cases it was not convenient to adhere to a strictly logical sequence of the articles. The author is aware that, considering the nature of the subject and the mental discipline which results from a sound course of it, this is a serious defect, yet in the present instance it is more than counterbalanced by certain advantages.

ELECTRIC LIGHTING ACT.

"The Electric Lighting Act, 1882. The Acts incorporated therewith. The Board of Trade Rules, together with numerous Notes and Cases." By **Clement Higgins**, Recorder of Birkenhead, M.A. (Cantab.), Fellow of the Physical Society of London, and **E. W. W. Edwards**, B.A. (Oxon.), Barrister-at-Law.

The editors of this statute in their prefatory observations truly remark that in the present crude and incomplete state of the law relating to the industrial applications of electricity, little more is possible than to bring together under one cover the Electric Lighting Act, 1882, the Board of Trade Rules, the Incorporated Acts and cases decided theron, together with such explanatory notes as have occurred to the authors after a careful study of the legal and technical aspects of the subject. It is hoped, however, that this will be of assistance to Local Authorities, Companies, and others, in applying for powers under, or in otherwise putting in force the provisions of, the Electric Lighting Act, 1882,

We may add, that for congruity of character in cases cited, apposite notes, legal knowledge, combined with scientific and technical information, this work is very praiseworthy; and, further, will be of considerable utility. One thing, however, we have not been able to discover, that is: What is the strict legal position of a Provisional Order or Licence? Perhaps the answer to this may be that it depends upon what their High Highnesses of the Board of Trade insert in the Orders and Licenses!

We shall doubtless have to make an early return to the subject referred to by this book.

SKETCHES AND TALES.

"Sketches and Tales." By **Thomas Newbigging**. Published by Sampson, Low, Marston, and Co., London.

The writer of this exceedingly entertaining little book is already favourably known to us as the author of a volume of poems of great beauty and deep feeling. The present volume of prose is in no way inferior to the former work, and shows a great amount of literary ability, coupled with a most fascinating manner of telling a story. Among the "sketches," those of Thomas Chatterton, the boy poet, and Oliver Goldsmith, deserve special notice. We most heartily wish the book every possible success.

OPTICS.

"Physical Optics," by **R. T. Glazebrook**, M.A., F.R.S., Fellow and Lecturer of Trinity College, Demonstrator of Physics at the Cavendish Laboratory, Cambridge. London: Longmans, Green, and Co.

The Science of Optics is generally divided into two parts, Geometrical and Physical. The former treats of the propagation, reflexion, and refraction of rays of light according to certain definite laws; the latter deduces those laws as consequences of a certain hypothesis, as to the nature of light, and in addition explains numerous phenomena which geometrical optics leaves unaccounted for. The main subject of this Text-Book is Physical Optics, but, the author in his prefatory remarks adds, throughout I have purposely avoided drawing a very decided line between the physical and geometrical portions. For this course there have been several reasons. The whole science of geometrical optics rests on the rectilinearity of rays of light. To explain the existence of these on the principles of the undulatory theory is one great difficulty of physical optics, and meets us at the very outset of the subject.

Many propositions deduced in books on geometrical optics from the laws of the reflexion and refraction of rays can equally well be established as direct consequences of the undulatory theory, and these have been treated somewhat fully in the chapter on prisms, and lenses, which has thus travelled out of the region usually indicated by the title of the book.

Again, to understand at all the arrangements of apparatus requisite for most optical experiments it is necessary to have a clear idea of the action of various combinations of lenses, and this has led to a detailed account of at least two forms of telescope. Much that relates to the spectroscope and spectrum analysis is usually considered geometrical. The physical cause of the dark lines in the solar spectrum and the connexion between the various kinds of spectra, however, form part of my subject, and accordingly a considerable portion of the book has been devoted to dispersion, achromatism, and the geometrical theory of the spectroscope.

" In only one or two sections of the book has any knowledge of mathematics beyond very simple trigonometry been assumed. As a necessary result of this some of the methods used will appear long and clumsy to those who are acquainted with the differential and integral calculus. But I wished to establish as rigidly as I could—considering the limits allowed me—the fundamental principles of the subject, and to escape the necessity of begging my readers to believe that, were those limits somewhat enlarged, I could prove much of what they were asked to assume in reading the book. Perhaps, however, it will be well for those who are approaching the subject for the first time to take for granted some of the propositions discussed in the earlier chapters. The rectilinear propagation of light with the laws of reflexion and refraction, and the explanation of the existence of rays, are among the most difficult points considered, and they meet us at the very threshold in Chapters II. and III. Those readers to whom those chapters present great difficulties will find it best to assume at first that we can show from the principle of the undulatory theory why light travels in straight lines and is reflected and refracted according to certain laws. Fresnel's theory of double refraction too will, no doubt, present difficulties, and the section dealing with it has been written rather with the view of giving a physical idea of the subject to those who have already attacked it from the mathematical stand-point.

The proofs of the work have been read through and corrected by my friend Professor Forsyth, of the University College, Liverpool, and many improvements are due to his suggestions. Mr. Merrifield, the general editor of the series, has always been ready to help me with his kind advice; while the frequent references to the writings of Professor Stokes, at whose request I undertook the book, will show how much I am indebted to him.

Several sections that are new to the text-books have been taken from the optical papers of Lord Rayleigh, while for others I have to thank the MS. notes and lectures of my friend and tutor, Mr. T. Dale, Fellow of Trinity College, to whose teaching I owe it mainly that I have been able to write the book.

My thanks, Mr. Glazebrook adds, are also due to Mr. M. Miley, of Trinity College, from whose photographs of apparatus in the Cavendish Laboratory some of the woodcuts have been taken.

After careful attention to the various chapters, and the very considerable quantum of information therein comprised, we can do no less than accord our highest meed of praise to this work.

Railway Bridges in Scotland.—The contract for supplying the material to be used in the construction of the Forth Bridge has just been assigned to the Steel Company of Scotland Glasgow. The bridge, which will be by far the largest in the kingdom, will be constructed entirely of steel. The Steel Company of Scotland, who have secured the contract, are also the contractors for the material to be used in the erection of the new Tay Bridge, which is being constructed by Messrs. Arrol and Co., Glasgow, who have already begun operations.

Sulphocyanide of Barium.—The adulteration of this substance is carried to such a degree that in some French specimens only 80 per cent of the pure salt—

$$Ba(SCN)_2 2H_2O,$$

was found, the impurities consisting largely of barium chloride. Dr. J. Tscherniac gives the following simple test. The sulphocyanide of barium is completely soluble in absolute alcohol, while all the barium salts that can be profitably employed for adulteration are insoluble in it, or very slightly so. Hence it is only necessary to shake a sample of the salt with two or three times its weight of alcohol, and then wash, dry, and weigh the insoluble residue, to determine the quantity of impurities.

THE CONTAGIOUSNESS OF CONSUMPTION.

It is now completely established, without doubt, that tubercular consumption is infectious to an extent which has hitherto hardly been dreamt of, and this fact is probably the chief cause of its having obtained such a fearful power over the human family.

It has been said that one-seventh of all the deaths throughout the entire world, and also one-third of the deaths taking place in the middle period of life, are caused by some form of tubercular disease. We have thus revealed what may be considered the most terrible scourge under which the races of mankind now suffer. That this is truly so will be apparent from the probability that there will not be one of the readers of this article who has arrived at middle age, but will have lost some relative or friend from this pestilent affliction.

To Dr. Koch, the learned chief of the Imperial Department of Health at Berlin, is due the honour of the final demonstration that tubercle is infectious, and of having also shown the various methods whereby contagion takes place.

The investigation of this subject has had a long history, consumption having been believed to be contagious by some very ancient physicians, amongst whom may be named Galen himself. It is recorded that he ordered his consumptive patients to inhale the vapours from the crater of Etna. The same opinion was held by Morgagni in his day. It seems that in Italy, Spain, and other southern countries, for ages the belief in the infectiousness of this affliction has been pretty general, which probably has had something to do with the fact that in those countries the disease is not so prevalent as in our own, where the contrary opinion has been so long held. Nevertheless, many in our own country have within recent times promulgated the idea of contagion, but of course without any real knowledge of the actual cause. Thus looking back some thirty years, we find the late Dr. William Budd, of Bristol, expressing the opinion that pulmonary consumption was allied to the eruptive fevers, and differed from them only in its degree of virulence, and consequent rate of progress. He entertained no doubt whatever of its highly contagious nature, or of the fact that its virulence in any country is in inverse ratio to the time of its duration there, being most rapid and fatal on its first introduction, and becoming, by long continuance, as in our own country, of a milder type and more chronic character. Thus when first introduced into the Sandwich Islands it sometimes proved fatal in less than six weeks; whereas it often drags on, in our country, a slow, and at times intermitting course, extending over months or years. Still these views of Budd obtained but few adherents, for the great bulk of physicians, dependent solely on clinical observation and practical experience, were decidedly of opinion that consumption could not be spoken of as a contagious disease in the same sense as the ordinary eruptive fevers are. Within later years, however, much has been done to give us more enlarged views on the subject of contagion, and much that mere practical experience could not determine has been solved, and made matter of demonstrative proof by recent experimental investigations.

About twenty years ago Buhl taught that acute tuberculosis was of an infective nature, but was owing to the existence of a primary inflammatory induration which had become caseously degenerated, and to the absorption of particles from the caseous mass. In 1865 Villemin commenced a series of experiments to prove that tubercle was an infective disease, and demonstrated the fact that caseation of the tuberculous matter was not necessary to constitute it a focus of infection. He took little bits of tuberculous matter, about a pin's head in size, from the body of a man, or cow, or rabbit, and inserted them under the skin of the ears, or other parts of dogs and rabbits. The result was that the wound at first healed, but afterwards became red and swollen, and ultimately ulcerated, owing to the development of a tuberculous mass. If these animals were killed after fifteen days from the date of inoculation, a caseous mass,—surrounded by small yellow granulations, was found at the seat of the wound; tubercles were found in the viscera, especially in the lungs; and infiltrated masses of tubercle were discovered in varying conditions, according to the date of the animal's death. He found like changes to occur in instances where he injected hypodermically small quantities of the sputa of consumptive patients, mixed with water.

Chauveau, of Lyons, obtained like results from all his experiments, which were of three kinds. First, he gave some oxen, by the stomach, portions of tuberculous matter got in some instances from man, and in other cases from oxen, which are very prone as a class to bovine tuberculosis; second, he inserted particles of tuberculous matter into the connective tissues; and, third, he injected into the veins water into which tuberculous matter had been placed and had been filtered. In all cases tubercle granulations were found in the lungs, and all the animals contracted tuberculosis.

Dr. Charles Creighton, in his interesting work on bovine tuberculosis in man, describes numerous cases in which a condition of organs in the human subject was found similar to that seen in oxen dead of tuberculosis; and he establishes the probability that the disease is not unfrequently transmitted to human beings through drinking the milk of diseased cows. Professor Gerlach also states that healthy oxen can be infected through the milk of sickly cows, or by taking with their food portions of tuberculous matter from the organs of affected animals.

Dr. Burdon Sanderson and Dr. Wilson Fox performed various experiments on rabbits and guinea-pigs, which they believed to prove that tuberculosis could be produced in these animals by inoculating them with any of the products of ordinary inflammatory action, or even by such substances as fatty liver or putrid muscle—nay, even by the production of local injuries, such as a deep wound.

For a time many concurred in these opinions, and viewed the bodies found after the experiments of Villemin, Chauveau, and others, as mere inflammatory products, and not true tubercles at all; but the tendency of more recent experiments is to cast doubt on the assertion that any irritating foreign body could induce tuberculosis in these animals, and to confirm the belief that true tuberculous matter alone can produce general tuberculosis.

Dr. Martin conducted two sets of experiments to prove the infectiveness of tubercle. With the greatest antiseptic precautions he injected into the peritoneal cavity of guinea-pigs irritating substances of vegetable and animal nature, such as pepper, cantharides, particles from the caseation of a sarcomatous tumour, and other non-tubercular matters, with the results that in most instances the animals remained quite healthy, and when killed had no disease of the viscera. Hence he concludes tubercle is an infective malady, owing to the presence of some morbific agent, peculiar to it, but undetermined.

If we turn again to French investigators we find that M. Giboux operated on rabbits directly with the air expired by consumptive patients, with a view to determine whether it could induce tuberculosis in healthy animals. Into one room he placed a cage containing two healthy rabbits, into which he passed daily, for some time, twenty or twenty-five litres of air expired by patients. Into another separated room he placed a second cage, also containing two healthy rabbits, into which he passed daily a similar amount of air expired by consumptives, but previously filtered through tow charged with carbolic acid. The consequences were, that at the end of about three months, the rabbits in the first-named cage became emaciated and showed signs of disease, and at death tubercles were found in all the organs, but especially in the lungs; whereas, in the second pair of rabbits, there seemed to be no injury to health at the end of a like period, and their organs, when the animals were killed, were found free of tubercles.

Tappeiner, Bertheau, and Weichselbaum, of Vienna, caused dogs and some other animals to breathe an atmosphere in which the sputa of consumptive patients and other forms of tuberculous matter were diffused in the form of spray; whilst they made others inspire air through which they diffused liquids impregnated with non-tuberculous substances. The results of these experiments were as follows:—In all cases where real tuberculous matter was used, tubercles were found in the lungs, kidneys, and other organs, but especially in the lungs. In those cases where non-tuberculous matter was sprayed into the air, either no tubercles were found, or only a very few nodules, and of doubtful character.

About five years ago, Professor Klebs stated that the contagiousness of tubercle was owing to a microphyte, and his discovery regarding tubercle was proved by Dr. Schüller, of Greifswalde, to hold good regarding certain affections termed scrofulous; as, for example, scrofulous affections of glands and scrofulous disease of joints, in all of which he said the same microphyte was found.

It is, however, to the experiments of Dr. Koch that we must look for the most striking and decisive results.

Koch had previously acquired great reputation by his exhaustive researches into the contagium of splenic fever. His aim was to discover what the precise character of the contagium was which rendered tubercular disease communicable from one individual to another, and capable of indefinite reproduction. The result of his experiments was, that in all true tubercles found in cases of general tuberculosis, a special micro-organism was discovered. It may be fittingly asked, "Do these micro-organisms or parasites occur in any numbers, do they in any degree infest the tissues of a healthy living body, or do they occur only in special states of disease?" Koch and others are decidedly of opinion that they do not occur in the tissues of healthy living bodies; and they have also proved that though different parasites live and flourish under somewhat varying temperatures and attendant circumstances, yet they all agree in this, that, when once introduced into the living body, their life and increase are greatly favoured by a low state of the general health. According to Koch, the tubercle bacilli are found within the giant-cells, and they are delicate rod-shaped bodies varying in length from one-quarter to one-half the diameter of a blood-corpuscle. We are further told that these bodies are most numerous in recent and advancing tubercle, and that they become fewer in proportion as the tubercle gets older, and finally disappear on the healing up of the tubercular disease. Dr. Koch also tested the expectoration of many who were suffering from consumption, and invariably found in it multitudes of bacilli, while he could discover none in the sputa of non-consumptive patients. He also found that the bacillus of tubercle required, in inhabitants of the temperate zone, about the warmth of the animal body for its growth and increase; and, in this respect, it differs from the bacillus of other diseases, for we are told that the bacillus anthracis found in cases of splenic fever can live in a temperature much lower than that of the body—outside the body in fact.

Having discovered the parasite, the next point which Koch set himself to discover was, whether or not it was the real and only cause of infection; or whether some of the matters by which it was surrounded were so. To determine this point it was needful to differentiate the bacilli from the tissues in which they lay; and this he succeeded in effecting by means of a special dye. To make sure that it was the parasite alone that was the medium of infection, and not any surrounding virus, he cultivated the bacilli artificially through many successive generations. With a speck of tuberculous matter from a human lung, he infected different substances, carefully prepared, so as to afford nutriment to the parasite. From these he infected fresh nutritive material, and so on, till many broods of the parasite were obtained. After the bacilli had been several times transferred from one soil to another, the original tubercular matter was at length got rid of, and nothing but the bacilli was left behind. Now, inoculation with these bacilli, isolated from all the original surrounding matter, was followed by reproduction of the parasite, and by the induction of tuberculosis, as certainly as was inoculation with a speck of tuberculous matter.

The same results followed when the bacilli were placed in fluids contained in porous clay vessels—inoculation with the fluid which was sweated through the clay was innocuous, while inoculation with the bacilli was followed by their reproduction, and by tuberculosis.

It will thus be seen that a belief in the contagiousness of consumption has probably been held by a few from a very remote age, which is at last justified by experimental research of a most exhaustive kind. It is utterly impossible to estimate the importance of these researches, as it will be palpable to all that, if proper precautions be taken to prevent infection with this disease, a rapid diminution of the number of deaths from this cause should begin to take place. Also, now that the nature of the plague is known, it is exceedingly probable that improved methods of treatment will be rapidly adopted.

This much may be safely asserted, that the results of all the experiments clearly indicate the parasitic origin of tubercle and the absolute need of fortifying the body against the inroad, and against all circumstances favourable to the development of the bacilli, as well as of aiming at the destruction of those already pervading the infected organs. With this in view, we must remember the importance of attending carefully to the improvement of the general health of all consumptives, to the avoidance of close confinement in over-heated and over-crowded rooms, to the keeping the patient as much as possible in the open air in suitable weather, to the careful ventilation of sleeping apartments and sitting rooms, while guarding against preventible draughts, to the separation of the healthy from the sick at night, and to warning the healthy against all inhalation of the breath of consumptive patients, who, in their turn, must be kept from re-breathing their own breath. Serious attention should be bestowed also on the disinfection of the sputa of consumptive persons; and much good may be expected also from the more assiduous use of antiseptic inhalations than has been practised in the past.

Further, we must have cottage hospitals in open suburban parts, in place of general or large special hospitals for consumptives; and, without doubt, a more careful supervision of the health of cows, whose milk is an article of daily use by the consumptive, and enters so largely into the dietary of all non-consumptives, especially into that of children, as the milk of animals suffering from tubercular disease is capable of transmitting it to healthy human beings.

W. G.

THE LATENT VITALITY OF SEEDS.

SOME preliminary experiments have been made by Messrs. P. Van Tieghem and Gaston Bonnier, says the *Gardener's Chronicle*, to ascertain the effects of different conditions on the latent vitality of seeds. On January 9, 1880, several packets of seeds were divided each into three equal parts. One portion was exposed to the free air, but secured from dust; another portion was put into closed air, securely corked up in a tube; while a third was placed in pure carbonic acid. At the end of two years the seeds were taken out and weighed, and afterward sown. As regards weight, all the seeds exposed to free air showed an increase. Thus, for example, fifty seeds of the common pea were found to have increased about 1-72 of their original weight; and fifty seeds of the French bean, 1-56 of their original weight. The seeds confined in closed air increased in weight, but infinitely less so than those exposed to free air; and the increase in some instances was so trifling as to be hardly measurable. Thus, fifty peas increased about 1-790 of their original weight, and fifty beans about 1-1190 of their original weight. As for the seeds placed in carbonic acid, they did not not vary half a milligramme from their original weight. The following are two examples of the comparative germination of the seeds, the conditions being as near as possible exactly the same.

Peas left in the free air, 90 per cent germinated; in the closed air, 45 per cent germinated; in the carbonic acid, 0 per cent germinated.

Beans left in the free air, 98 per cent germinated; in the closed air, 2 per cent germinated; carbonic acid, 0 per cent germinated.

PROFESSOR HAECKEL IN CEYLON.

"MY frugal dinner at an end, I usually took a solitary walk on the shore, or delighted my eyes with the sight of the illumination of the palm woods by myriads of fire-flies and glow-worms. Then I made a few entries in my note book, or tried to read by the light of a cocoanut oil lamp. But I was generally quite tired enough to go to bed soon after nine o'clock, after another careful shaking of the clothes for the expulsion of scorpions and millipeds.

"The great black scorpion (nearly a foot long) is so common in Ceylon that I once collected half a dozen in the course of an hour. Snakes exist also in great numbers. Slender green tree snakes hang from almost every bough, and at night the great rat snake *Coryphodon blumenbachii*) hunts rats and mice over the roofs of the huts. Although they are harmless and their bite not poisonous, it is by no means a pleasant surprise when one of these rat snakes, five feet long, suddenly drops through a hole in the roof into one's room, occasionally alighting on the bed.

"On the whole, however, my nights in Belligam were but little disturbed by animal intruders, although I was often kept awake by the howling of jackals and the uncanny cry of the devil bird (a kind of owl, *Syrnium indrani*) and other night birds. The bell-like cry of the pretty little tree-fogs which make their dwelling in the cups of large flowers, acted rather as a slumber song. But I was far oftener kept awake by the whirl of my own thoughts, by the recollection of the many events of the past day, and the anticipation of that which was to come. A brilliant succession of lovely scenes, of interesting observations, and varied experiences mingled in my brain with plans of fresh enterprise and new discoveries for the morrow."

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SESSION 1882—1883.

February 8th, Patent Law Conference.

February 22nd, Executive and General Council Meeting.

Subscriptions are payable to Mr. G. A. Stretton, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.

F. W. Campin, Sec.

Proceedings of the Institute.

N.B.—The points of Patent Law that have been approved by Members of the Inventors' Institute may be read in connexion with the various remarks made at the Dinner, especially those by Mr. Spagnoletti, viz., (1) Provisional Protection to be twelve months and not more than ten shillings cost; (2) Full investigation of Patented Inventions, and if possible non-impeachment of validity of Patents; (3) Reform of Patent Litigation.—Mr. Anderson's Bill gives an idea of some of these points.

During the past month a communication to the Government on the Patent Law was directed to be sent by the Secretary. No reply has yet been made.

Monthly Notices.

Beef and Mutton.—Prof. Kolbe has proved experimentally that beef kept in an atmosphere of carbonic acid remains sound and retains its natural flavour for many weeks. Mutton treated in the same manner becomes offensive in about eight days.

Yeast for Rock Splitting.—A German brewer in Nevada, having heard of the lime process for mining coal, proposes to use yeast as an agent for rending rocks. He has in his experiments blown strongly hooped casks to pieces, and forced out one end of his brewery. He desires to make experiments in the Comstock mines, the heat of which will set up fermentation the moment the yeast charge is tamped, which will soon become so active as to overcome every resistance.

Incandescent Lamps.—M. de Changy claims to be the first electrician who attempted, twenty years since, to construct incandescent electrical lamps *in vacuo*. He formerly cut his carbons from the graphite in the gas retorts. His fibres are now carbonised in the usual manner.—*Athenæum.*

Water Marking of Paper.—Our contemporary the *Athenæum* has the following:—Messrs. Brown, Barnes, and Bell have forwarded to us several examples of a new process which they have named "photo-filigrane," for producing the water-mark in paper by a photographic process, the invention of Mr. Walter R. Woodbury. The result is stated to be produced by engraving steel rollers by photography, between which the paper is passed under pressure. The effects, which are interesting, can be obtained from anything from which a photographic negative can be taken. It appears to us obvious that the raised surface required on the roller may be effected by the action of light on bichromate of potash and gelatine or some similar actinic agent.

Mr. Alexander Graham Bell has published an important paper "Upon the Electrical Experiments to Determine the Location of the Bullet in the Body of the late President Garfield; and upon a Successful Form of Induction Balance for the Painless Detection of Metallic Masses in the Human Body," with illustrations of the apparatus.

A *photometer* on the wedge principle, consisting of a wedge of neutral-tinted glass placed in the track of a beam of light from the source to be measured, and a certain thickness of the glass, is so regulated as to partially dilute the ray, which is reflected by a mirror upon a disc of opal glass. An adjoining disc has a standard oil lamp. The wedge is moved in and out until the two discs become under illumination practically the same, and the thickness of the wedge on the scale indicates the relative proportion of the lights.

Premium for a Perfect Safety Lamp for Miners.—Mr. Ellis Lever, of Culcheth Hall, Bowdon, Cheshire, agrees to hand over to the Central Board of the Miners' National Union, the sum of five hundred pounds, to be paid as a Premium to any person, either in or out of the United Kingdom, who shall invent a Portable Electric or other Safety Lamp, to be used in Mines. The following are the conditions:—1. The five hundred pounds to be invested in the names of three Trustess, one of whom shall be Mr. Thomas Burt, M.P., the other two to be chosen by the Central Board of the Miners' National Union. 2. The lamp to be a perfectly Portable Electric, *or other lamp*, which the working miners can conveniently carry from place to place in the mine, and which will not, under any circumstances whatever, cause an explosion of gas. 3. The efficiency of the lamps put in for competition, to be submitted to five gentlemen, composed as follows:—Three scientists to be named hereafter, one to be selected by Mr. Lever, one by the Council of the Royal Society, and one by the Council of the Society of Arts, one person representing the Mining Engineers, chosen by themselves, and one person representing the workmen, chosen by the Central Board of the Miners' National Union. 4. The adjudicators to meet in London after the allowed time has elapsed. 5. The offer to remain open until the 31st day of December, 1883. If a lamp, meeting the requirements herein stated, has not then been invented, the five hundred pounds to revert back to Mr. Ellis Lever.

THE SCIENTIFIC REVIEW
AND
Scientific and Literary Review
INCORPORATING THE "JOURNAL OF THE INVENTORS' INSTITUTE."

FEBRUARY, 1883.

GOODS TRANSIT.

The transit of goods, especially raw material, from our ports of entry to the chief centres of industry is fast becoming a question of first class importance, and one which with the advance of time will become more and more pressing for a really practical solution. It is not that the present railway system is unable to cope with the quantity of traffic, for in this particular there is doubtless capacity for carrying far more than is likely to be required for a long time to come ; but the method at present adopted is, in these days of keen and close competition, far too costly. We give every credit to the great carrying companies for having reduced their rates to the lowest point compatible with their expenditure ; nevertheless we believe it is in their power, by an entire alteration in their mode of working, to bring down the cost for labour, with regard to heavy goods traffic at least, to such a point as would enable them to deal with this question in a perfectly satisfactory manner. That something must be done is clear, for already great schemes are afloat for constructing more than one ship canal, with the object of cutting the knot of this problem. Whereas, if the Railway Companies had been more alive to the necessities of the age, and less intent on discovering the best way of standing still, we contend that these projects would never have been thought of.

Now let us enquire where there is room for reducing the expenses of heavy goods transit. For this purpose we will divide the work into its various departments, viz. :—1. Collection and haulage from dock to rail. 2. Transit per rail. 3. Delivery. 4. Office work. And, as a ship canal is projected between Liverpool and Manchester, we will consider the lines between those two cities for the purpose of illustration. Taking the matter of office work first, we find perpetuated on these lines an old arrangement whereby the cartage of certain classes of goods is made a separate charge from the carriage thereof, which in itself causes about double the amount of bookkeeping to what, under a more enlightened method, would be necessary. There are several minor matters where both greater efficiency and economy might be effected ; but the system we have named is not only continued at a great and unnecessary cost to the companies, but also to the intense annoyance, as well as petty loss, of hundreds of their customers.

With regard to the cost of actual transit by rail, it is probable that not much direct economy can be effected, or is even desirable ; yet there are many details in which reform is highly necessary, and which would indirectly be the means of reduced expenditure. The greatest evil, however, which we can perceive in the present system is the necessity for constant loading and unloading for the purposes of transit and delivery. Indeed, this is the strongest argument used by the advocates of ship canals, who are quick to see and show the great advantage of having only one loading for final delivery to the consignee.

How then is a railway to compete with such a thing as continued water carriage ? Certainly only in one way, and that is to bring their system of working to the self-same degree of simplicity. In other words, they must have their trucks loaded at the shipside, and taken without further disturbance direct to the consignee. This, with the adoption of uniform inclusive rates, would solve the whole difficulty of both the costs of transit and office work together.

That this is not only possible but exceedingly simple and practicable we are perfectly convinced, as will be seen by the following explanation of the means we suggest for accomplishing the object. Two new things require to be designed or invented for this purpose, and we ourselves should be perfectly willing to undertake them—first, a special lurry or collecting waggon ; and, second, a new truck for the rails, capable of taking bodily on board, the lurry with its load, having due regard to loading line, &c. The goods could thus be loaded at the shipside, irrespective of position in dock, or whether a line of rails came down to the wharf or not. The vehicles could then be drawn direct by the horses on to the trucks, which would be placed in suitable docks or bays for the purpose, and there mechanically held in position until their arrival at the destined station, whereupon the lurry would be, at convenience, drawn away to the mill, or warehouse, of the consignee ; in most cases insuring them to be in far better condition than is the case under the present system, where much tumbling and knocking about of merchandise is well nigh inevitable.

It must not be understood from the foregoing that we desire to in any way deprecate the ship canal project, as we have already written wishing this every success. In fact, we are of opinion that even when such canals are made, a plan of the kind we have indicated will ultimately have to be adopted, or the Railway Directors will find that, in the near future, the work of loading and unloading may become their chief occupation.

If such an improved method of carriage were introduced between the most important ports and business centres, it would doubtless at present suffice ; nevertheless an universal application of the plan would be of enormous advantage to the business men of the country, and we are perfectly sure it would also redound to the profit and influence of the railway companies in all parts of the kingdom.

W. G.

Proceedings of Societies.

ROYAL SOCIETY.

Jan. 11.—The President in the chair. The following papers were read:—"Experiments, by the Method of Lorenz, for the Further Determination of the Absolute Value of the British Association Unit of Resistance, with an Appendix on the Determination of the Pitch of a Standard Tuning-fork," by Lord Rayleigh and Mrs. Sidgwick. "On the Skeleton of the Marsipobranch Fishes, Part I., The Myxinoides (*Myxine* and *Bdellostoma*)," by Prof. W. K. Parker, and "The Direct Influence of Gradual Variations of Temperature upon the Rate of Beat of the Dog's Heart," by Dr. H. N. Martin.

THE INSTITUTION OF CIVIL ENGINEERS.

Dec. 19 (Annual General Meeting).—Sir W. G. Armstrong, C.B., F.R.S., the President, in the chair. In the report of the council it was remarked that the steady progress which throughout had been characteristic of the Society showed no sign of diminution, and that the Institution occupied a higher position now than at any previous period of its existence as shown by the number of its constituents, by the importance of its publications, by its relations with kindred associations in all parts of the world, and by its financial condition. During the past session 238 candidates had been elected, and 90 names had disappeared from the register, leaving a net gain of 148, which had increased the aggregate of all classes to 3,385, irrespective of the students. Of the latter, 149 had been admitted, and 104 had been removed from the list, leaving an effective increase of 45, and making the total number 707. Whatever development the work of the Institution might take in the future, the Minutes of Proceedings would always rank as its most important production, constituting the tangible and useful result of its labours, and the ground upon which its claim was mainly based to the consideration of the profession. There was one notable distinction between the contents of the early volumes and those at present issued, viz., that the Papers reserved for reading now were of a more debateable character than formerly. Attention was specially directed to the "Correspondence" appended to the reports of the discussions. Originated with the idea of eliciting opinions from persons known to be well acquainted with the subjects brought forward, but who were unable to attend the meetings, the value of this departure from pre-established usage became particularly manifest as the debates assumed a more controversial character, inevitable when principles were being considered. It was now deemed better to include accounts of executed works, unless of remarkable novelty and magnitute, or unless illustrative of principles likely to evoke discussion, in Sect. II. of the proceedings, which was devoted to original communications accepted by the Council for printing without being publicly read. In the award of premiums, no distinction was made between the two classes of papers. The sixteen papers read at the twenty-five Ordinary Meetings last session were then briefly noticed. All the authors, whether belonging to the Institution or not, were equally eligible to receive premiums, and, as a matter of fact, three of those who had secured the highest awards were outside the society. Students' Meetings had been held on twelve occasions; but the council regretted to find that there was some falling off in the quality of the communications as compared with previous years. The Foreign Abstracts, constituting Sect. III. of the Proceedings, continued to receive the approval not only of the members but also of foreign engineers, who frequently and earnestly expressed their sense of the advantage of thus summarizing the current professional literature of all countries. After the close of last session the premises had been redecorated, new carpets had been purchased, and the furniture had been re-polished and recovered. Ten years having elapsed since similar extensive repairs were undertaken, any further delay seemed undesirable. But the limit of the accommodation in the present house for the library and for the offices had been reached, and it was doubtful whether any modifications of the internal arrangements would afford the necessary room. When the existing building was first occupied in November, 1868, the number of members (of all classes) was 1,682, now it was 4,092; then the library contained about 6,000 volumes, whereas at present there were upwards of 18,000; the growth of the business of the Institution might be further inferred from the fact that fourteen years ago a 1,000 page letter book sufficed for nine months, whilst now it only lasted six weeks. Respecting the financial condition of the Institution, it was stated that the income proper for the year ended on the 30th ult. had amounted to £12,898; whilst the capital and trust fund receipts were £3,527 and £432 respectively. On the other hand the general expenditure had reached £12,788. This amount included £1,500 on account of the repairs and decoration of the premises; as well as £5,806, the cost of producing the four volumes of Minutes of Proceedings. A further investment had been made on account of capital, by the purchase of £3,000 London and North Western Railway Four per Cent. Debenture Stock at a cost of £3,380, while a sum of £497 was expended under Trusts. The Council had recently received a communication which recalled the memory of one of the founders of the Institution. This gentleman, Mr. Henry Robinson Palmer, was well known to the last generation of engineers as Telford's chief assistant, and as a Vice-President of this Society. He died in the prime of life in 1844, but his widow survived until this year. Desiring that the honourable connection of her husband with the profession should be perpetuated, she, by a memorandum attached to her will, directed that a sum of £1,500 (less legacy duty) should, on the expiry of a life interest in it, be devoted to found a Scholarship at Cambridge University, tenable by the son of a Civil Engineer who needed the help, the holder to be from time to time nominated by the Council of the Institution. The present Council, for itself and its successors, had accepted the Trust. After the reading of the Report, the Premiums that had been awarded for Papers disposed of during the session 1881-82 were presented by the President, who addressed a few appropriate words to each recipient when at the Council table. The awards included Medals and Telford Premiums to Dugald Clerk, J. J. Coleman, W. P. Baker, and J. G. Mair; a George Stephenson Medal and a Telford Premium to Thos. F. Harvey; Telford Medals and Telford Premiums to James Mansergh, W. S. Boult, and J. J. Potts; Telford Premiums to W. H. Wheeler, L. F. Vernon-Harcourt, M.A., E. Matheson, C. H. Moberly, R. Harvey, J. Barron, P. W. Meik, and H. P. Higginson; and the Manby Premium to H. J. Butter. Some of the Papers submitted by Students had obtained awards as follows, viz.: the Miller Scholarship to Alan Brebner, jun., B. Sc.; and Miller Prizes to J. A. Thompson, A. H. Case, W. T. Batten, W. Bashall, R. M. Parkinson, L. Samuel, and U. H. Broughton.

Jan. 16.—Mr. J. Brunlees, President, in the chair. The paper read was "On the Antwerp Waterworks," by Mr. W. Anderson.

GEOGRAPHICAL SOCIETY.

Jan. 15.—Right Hon. Lord Aberdare, President, in the chair.—The following gentlemen were elected Fellows: Col. C. F. Roberts, Major G. Barker, Rev. W. H. Penney, Messrs. J. Bevan, E. C. Davis, C. H. Harper, T. S. Hudson, T. A. Routh, and P. Winser. The paper read was "On Commercial Routes between Central Persia and the Sea, and Recent Explorations in Southern Persia," by Col. J. U. B. Champain.

ASTRONOMICAL SOCIETY.

Jan. 12.—Mr. E. J. Stone, President, in the chair. Dr. A. H. Howe, Rev. J. C. Lunn, Messrs. C. Green, S. T. H. Saunders, E. J. Spitta, and W. H. Walmsley were elected Fellows. Mr. Hind mentioned that Dr. Peters had presented to the Society a set of twenty zodiacal charts showing stars down to the fourteenth magnitude. The charts were photo-lithographic copies from the charts he had prepared for use in searching for minor planets. The President called on Prof. S. Newcomb to give some account of the observations of the transit of Venus which he had made at the Cape of Good Hope. The weather was perfectly clear during the time of the observation. Before first contact, Prof. Newcomb was unable to detect any trace of the planet outside the sun's limb. When the planet had entered half way upon the sun's disc it appeared as if a piece of the sun had been sharply cut out with a knife, and a line of light around the dark body of the planet, which he had hitherto looked for in vain, began to show itself, but it was not continuous. As internal contact approached it became decidedly brighter over a portion of the arc, and just before internal contact it was seen as a narrow line of bright light joining the cusps of the sun, which appeared blunted by reason of irradiation. Ultimately the light of the cusps appeared to dissolve or flow into this line of light. At this time there was a hesitation in Prof. Newcomb's mind, for a period of only about five seconds, as to whether geometrical contact had taken place. After this period the light flowed in from either side with great rapidity, and Prof. Newcomb did not notice anything like a shade or ligament joining the body of the planat with the sun's limb. Mr. Knobel read a paper, by Prof. Langley, "On Observations of the Transit of Venus as Observed at the Allegheny Observatory." The paper was accompanied by a drawing showing the line of light with a patch of increased brightness on one side and a minute brilliant stellar point close to the patch of brighter light. Prof. Newcomb said that Prof. Langley's drawing very accurately represented what he had himself seen. Mr. Horner, who had observed the transit near Bath, said that he had also seen the brighter patch of light, and that it appeared to extend over the body of the planet to perhaps a third of a radius from the limb. Prof. J. C. Adams read a note on William Ball's supposed discovery of the division in the outer ring of Saturn. He had found amongst the Royal Society manuscripts a letter in William Ball's handwriting, dated the 14th of April, 1666, in which he mentions that his observations of Saturn had been made with a telescope 38 feet in length and with an eyepiece of two lenses, and partly with a telescope of 12 feet focal length. Huygens refers to Ball as an accurate observer who had seen the shadow of the ring upon the body of the planet when the ring was turned so that the ansæ were lost to sight. Prof. Adams consequently concluded that the curious figure in the first volume of the *Philosophical Transactions*, which shows the ring with a shallow notch at each extremity of the minor axis, cannot have had its origin in the defective observations of Ball. Amongst the manuscripts of the Royal Society is a paper cutting representing the planet and its ring as shown in the plates in the *Philosophical Transactions*. This defect Prof. Adams supposes must have been due to the paper having been folded in the direction of the minor axis before the ring was cut out. The defect seems soon to have been discovered, for the plate was cancelled, and in other copies a plate in which the picture of Saturn is omitted is to be found. This appearance of a double ring enclosing Saturn appears to have been the origin of the idea that Ball observed two concentric rings.

GEOLOGICAL SOCIETY.

JAN. 10.—Mr. J. W. Hulke, President, in the chair.—The Earl of Dysart. Messrs. T. W. E. David, S. Fagan, J. J. Hamilton, F. A. Lucas, and M. Staniland jun., were elected Fellows; and Dr. O. Torell, of Stockholm, a Foreign Member. The following communications were read: "On the Lower Eocene Section between Reculvers and Herne Bay, and some Modifications in the Classification of the Lower London Tertiaries," by Mr. J. S. Gardner, and "On Mr. Dunn's Notes on the Diamond Fields of South Africa, 1880," by Mr. F. Oats.

METEOROLOGICAL SOCIETY.

JAN. 17.—(Annual General Meeting.) Mr. J. K. Laughton, President, in the chair. The Secretary read the report of the Council, which showed that the total number of Fellows was 571, forty-seven new Fellows having been elected during the year. The President then delivered his address, He referred briefly to the great importance of the uniform series of observations now taken under the auspices of the Society, and proceeded to speak at greater length of certain other points in which the Society might by its concerted action further the interests of meteorological science. The following gentlemen were elected Officers and Council for the ensuing year: President, J. K. Laughton; Vice-Presidents, E. D. Archibald, R. Field, B. Latham, and Dr. W. Marcet; Treasurer, H. Perigal; Trustees, Hon. F. A. R. Russell and S. W. Silver; Secretaries, G. J. Symons and Dr. J. W. Tripe; Foreign Secretary, R. H. Scott; Council, Hon. R. Abercromby, W. M. Beaufort, J. S. Dyason, H. S. Eaton, W. Ellis, Dr. J. H. Gilbert, C. Harding, R. J. Lecky Capt. J. P. Maclear, E. Mawley, G. M. Whipple, and Dr. C. T. Williams.

MATHEMATICAL SOCIETY.

JAN. 11.—Prof. Henrici, President, in the chair. Messrs. H. T. Gerrans and W. L. Mollison were elected Members. Dr. Hirst spoke "On the Resolution of Congruences into Systems of Quartic Reguli." Mr. Glaisher discussed the solution of a differential equation allied to Riccati's, and Mr. Tucker communicated a paper, by Prof. Cayley, "On the Automorphic Transformation of a Binary Cubic Function."

SOCIETY OF BIBLICAL ARCHÆOLOGY.

JAN. 9.—Dr. S. Birch, President, in the chair.—The Secretary's report was read.—The following Officers and Council were elected:—President, Dr. S. Birch; Vice-Presidents, Rev. F. C. Cook, Rev. G. Currey, Sir H. S. Giffard, Right Hon. W. E. Gladstone, Right Rev. J. B. Lightfoot, W. Morrison, C. T. Newton, Sir C. Nicholson, Bart., Rev. G. Rawlinson, Sir H. C. Rawlinson, Very Rev. R. P. Smith, and Sir E. Wilson; Council, R. Bagster, W. Beamont, W. Besant, Rev. C. J. Ball, Rev. Canon Beechey, A. Cates, T. Christy, R. Cust, C. Harrison, Rev. A. Löwy, Rev. S. S. Lewis, F. D. Mocatta, J. M. Norman, A. Peckover, F. G. H. Price, P. Le Page Renouf, V. Stuart, Col. Warren, and Rev. W. Wright; Hon. Treasurer, B. T. Bosanquet; Secretary, W. H. Rylands; Hon. Sec. for Foreign Correspondence, Rev. A. H. Sayce.

ANTHROPOLOGICAL INSTITUTE.

JAN. 9.—Mr. A. L. Lewis in the chair.—The election of Admiral F. S. Tremlett was announced.—Mr. W. G. Smith exhibited four palæolithic implements from Madras. One of them weighed 4lbs. 7¾ozs., and the author believed that it was the largest specimen of the kind extant.—Mr. W. S. Duncan read a paper "On the Probable Region of Man's Evolution." Starting from the assumption that man was evolved from a form lower in organisation than that of the lowest type yet discovered, and that his origination formed no exception to the general law of evolution recognised as accounting for the appearance of the lower forms of life, the author said that man's most immediate ancestors must have been similar in structure to the existing anthropoid apes, although it is not necessary to suppose that any of the anthropoid apes at present existing belong to the same family as man. The science of the distribution of animals showed that the higher types of monkeys and apes appear to have had their origin in the Old World, the American contingent being entirely destitute of them, either alive or fossil. The distribution of the greater portion of the animals of the Old World was shown to have taken a generally southward direction, owing to the gradual increase of the cold, which culminated in the last ice age. This migration was, however, interrupted by the interposition of the Mediterranean and other seas; and thus, although a few of these animals were enabled to journey on until they reached tropical regions, the majority were compelled to remain behind, where they had to exist under altered circumstances. The temperature was much lower: and as a result of the consequent diminution of fruit forests a change in the food and in the manner in which it was obtained by the apes occurred. A considerable alteration also took place in the manner in which they were forced to use their limbs, and it was due to the operation of these and other causes that the ape form became stamped with human characteristics, such as the curvature of the spine and an increase in the breadth of the pelvis. For these reasons the author regarded the south of Europe as the part in which it was most likely that the evolution of man took place. Mr. Duncan concluded by urging the importance of forming a committee to watch discoveries bearing on this branch of anthropology.

NEW SHAKSPERE.

JAN. 12.—Mr. F. J. Furnivall, Director, in the chair. The Rev. W. A. Harrison read a paper "On the Textual Difficulties in 'Richard II." The text of the first quarto was immeasurably the best; each of the others was a deterioration from the one before, down to the folio, which was the worst. The difficulties in the play might be divided into two classes, textual difficulties proper and editors' difficulties. Mr. Harrison then dealt, in their order, with nineteen difficulties, such as "The sly slow hours" (I. iii. 150); "far" or "fare" (I. iii. 193); "As praises of his state," &c. (II. i. 17); "self-borne" or "born" (II. iii. 80); "globe that lights," or "and lights" (III. ii. 37): "*Three* Judases" (III. ii.); the "bucket" simile (IV. i.), &c.; and concluded with an exhaustive note on the "clock" simile (V. v.).

ARISTOTELIAN SOCIETY.

JAN. 15.—Mr. W. R. Dunstan, V.P., in the chair.—A discussion took place on the President's address.

JAN. 22.—Mr. S. H. Hodgson, President, in the chair.—The study of Kant's "Critic of Pure Reason" was resumed and further progress made, Mr. H. W. Carr opening the discussion.

NUMISMATIC SOCIETY.

JAN. 18.—Dr. J. Evans, President, in the chair.—Mr. R. K. Walker was elected a Member.—Mr. Evans brought for exhibition four varieties of the Pontefract Castle siege pieces dated 1648; two issued in the reign of Charles I., and two after his death.—Mr. B. V. Head exhibited a silver medal struck to commemorate the erection of the Egyptian obelisk in the Central Park of New York.—Mr. J. G. Hall exhibited a specimen of the "Rebellen Thaler" of Henry Julius, Duke of Brunwick-Wolfenbüttel, 1595, on the reverse of which is a representation of the destruction of Korah, Dathan, and Abiram, accompanied by the letters N. R. M. A. D. I. E. S., supposed to stand for "Non recedit malum a domo ingrati et seditiosi." This was probably intended as a warning to the citizens of Brunswick, with whom the Duke was then at feud on the question of rights and privileges.—Mr. H. Montagu exhibited an unpublished Rose-noble of Edward IV., in fine preservation, but weighing only 114 grains instead of 119½ grains, with a small fleur-de-lis as a mint mark on the reverse and on the obverse a sun; also unpublished varieties (1) of the noble of Edward III. with HIB. or HYB., still further contracted to the single letter B. in the obverse legend, and (2) of the light noble of Henry IV. with an annulet on the side of the ship in juxtaposition to the usual trefoil.—Mr. Head read a paper, by Mr. E. H. Banbury, on some unpublished tetradrachms bearing the name of Alexander the Great. Among these the most remarkable was one of very fine style and perfect execution, and having in the field of the reverse as an accessory symbol a small copy of the celebrated statue known as the Farnese Hercules, or rather of the original statue of Hercules by Lysippus, of which the existing statue by the Athenian sculptor Glykon is itself a copy.

CHEMICAL SOCIETY.

JAN. 18.—Dr. Gilbert, President, in the chair.—It was announced that a ballot for the election of Fellows would be held at the next meeting, February 1.—The following papers were read:—"The Fluorine Compounds of Uranium," by Mr. A. Smithells. The author confirms the results previously obtained by Bolton, and proves those obtained by Ditte to be erroneous.—"On a New Method of estimating the Halogens in Volatile Organic Compounds," by Mr. R. T. Plimpton and Mr. E. E. Graves. The authors burn the vapour of the compound in a glass Bunsen burner; the products of the combustion are aspirated through caustic soda solution, which is treated with sulphurous acid and the halogen precipitated by silver nitrate, &c., in the usual way. Good results were obtained with various liquids, from ethyl bromide, boiling at 30°, to acetylene bromiodide, boiling at 150°.—"On a Modified Liebig's Condenser," by Mr. W. Shenstone. The author has slightly modified a vertical condenser, so that it can be used for prolonged digestion and subsequent distillation without shifting.—"On Two New Aluminous Mineral Species, Evigtokite and Liskeardite," by Mr. W. Flight.—"On the Volume Alteration attending the Mixture of Salt Solutions," by Mr. W. W. J. Nichol. The salts employed were $NaCl$, KCl, KNO_3, $NaNO_3$, $CuSO_4$, and K_2SO_4.

PHILOLOGICAL SOCIETY.

JAN. 19.—Dr. Murray, President, in the chair.—The Chairman stated the present condition of the Society's new English Dictionary, of which he is the editor. About half of Part I. was stereotyped, to *Age*. That took 176 pages. The other half ought to run to *App.*, but probably would not include so much. In Littre *Age* runs only to p. 75. Proofs were out to *Albacore*. The number of words to *Age* were 4,100, more than double Webster's in both his dictionary and supplement, namely, 2,023. To these 4 100 words different forms had to be added, making a total of 5,577. In the work done the number of Anglo-Saxon or "aboriginal" words was very small—about one-eleventh of the whole number. Some hundred readers were still at work, and nearly every day brought its packet of slips, sometimes with new A words or new senses. About thirty sub-editors were also at work, and for their quiet labours the Society and the editor could not be too grateful. Specimens of false words (misreadings of MSS. or text) were given. The treatment of compounds was discussed; and the dictionary articles on *æsthetic, -æ, -ade*, and *agnail* were read.—A vote of thanks to Dr. Murray and his helpers was proposed by Mr. Furnivall (former editor of the dictionary), seconded by Mr. A. J. Ellis, and carried unanimously.

HISTORICAL SOCIETY.

JAN. 17.—Mr. C. Walford in the chair.—Prof. Seeley, Rev. G. W. James, Rev. E. Price, Rev. T. A. Taggart, Major J. Davis, Messrs. N. H. Aspden, G. E. Bowker, Oscar Browning, S. J. Cartlidge, E. F. Cherry, J. Chester, C. H. Harper, and T. B. Trowsdale were elected Fellows.—The Rev. E. R. Christie read a paper "On the Government of Charles I.—A discussion followed, in which the Rev. Dr. Thornton, Mr. E. A. Ainslie, Mr. Alderman Hurst, and the Chairman took part.

SOCIETY OF ARTS.—The following are the premiums offered by the Society of Arts for the 129th Session of the Society (1882-3):—John Stock Prize.—A Society's Gold Medal, or £20, for the best design, from a poem, or from history, or from the Scriptures, prepared with a view to Mural decoration. Benjamin Shaw Prize.—1. A Society's Gold Medal, or £20, for the best plan for "obviating or diminishing risk to life in the operations of coal-mining." 2. A Society's Gold Medal, or £20, for the best plan for "obviating or diminishing risk to life in the manufacture, storage, and transport of explosives." The Council of the Society leave it to the competitors to bring the plans under their notice in any way they may think proper, whether by model, written description, or otherwise. Howard Prize.—A prize of £100 for the best Essay on the Utilisation of Electricity for Motive Power. Preference is to be given to that Essay which, besides setting forth the theory of the subject, contains records with detailed results of actual working or experiment. The Society reserves the right of publishing the Prize Essay. Fothergill Prize.—A Society's Gold Medal, or £20, for the best Invention having for its object the Prevention or Extinction of Fires in Theatres, or other Places of Public Amusement. Mulready Prize.—A Society's Gold Medal "To that student in a School of Art in the United Kingdom who exhibits the best Drawing from the nude figure, executed in black and red chalk, in the manner so successfully practised by Mulready." Designs, plans, models, essays, descriptions, inventions, &c., intended to compete for any of the above Prizes, must be sent in on or before the 31st October, 1883, to the Secretary of the Society of Arts, John-street, Adelphi, London. The Council of the Society reserve the right of withholding any or all of the above Prizes, or of awarding others of lesser value in their stead, in any case in which there is nothing in their opinion deserving the award, or sufficiently complying with the conditions sent in for competition.

COLLIERY EXPLOSIONS AND WARNINGS IN 1882.

ALTHOUGH the number of explosions during the past year reached about the same total as in 1881, there was, unfortunately, a very large increase in the number of deaths recorded. In 1881 there were 31 explosions, causing 116 deaths; in the year just closed the newspapers reported 28 explosions, 15 of which were fatal to 241 persons, at least 100 persons were injured, and the property destroyed was enormous. In three of the explosions 140 horses were killed, besides many more not enumerated in other explosions. The following were the fatal explosions:—Risca, 4 lives; Rhondda, 4; Trimdon Grange, 80; Blaine, 5; Tudhoe, 38; West Stanley, 13; Whitehaven, 4; Burncliffe, 7; Baxterley, 32; Treorky, 1; Hamilton, 3; Burnley, 1; Silverdale, 2; Maesygrug, 2; Claycross, 45. In the case of the Rhondda explosion the gas was ignited from a fire in the shaft which had already caused the loss of two lives. Ventilation was at a standstill. The Baxterley disaster was due to a fire in the workings (from the machinery) generating a quantity of gas. These two cases are therefore omitted in the remarks on atmospheric pressure.

Thirty-two colliery warnings were issued during the year, 19 of which were justified by subsequent events; 12 were followed within less than three days by 15 explosions, causing 139 deaths, two by 43 deaths on the fifth day, and 23 lives were lost on the sixth day, or a total of 205 lives lost in six days from the issue of the warnings. Five lives were lost on the day of issue, the warnings being published in the press on the following day. In each case those explosions which occurred on the fifth and sixth days were proceeded by warnings indicating prolonged unfavourable conditions. Adding to our list four continental explosions, causing 98 deaths, and tabulating them according to the atmospheric conditions existing at the time, we find that with a rising barometer there were 23 explosions, causing 298 deaths, with a falling barometer, six explosions, all non-fatal, and with a steady glass one explosion, causing five deaths. Looking at the results in another way, there were 20 explosions, causing 227 deaths, with the barometer ranging from 29·9in. to 30·6in., the mean being 30·15in.; with the barometer below 29·9in. there were 10 explosions, causing 76 deaths, the mean barometer being 29·5in. Only ten out of the 30 disasters were accompanied by winds south of west and east.

These facts support the belief which is gradually gaining ground that the period of greatest danger to miners is that when the barometer is high, or rising, although fire-damp undoubtedly appears in greater quantities in the mine when there is a decrease of atmospheric pressure. Some well-known mining engineers declare that the gas makes its presence felt long before the barometer shows a sign of falling; that the gas, in fact, is so sensitive a barometer as to denote changes of temperature much earlier than mercury. It is highly probable that officials and men being conversant with the fact of more gas appearing with decreasing pressure, relax their precautions against their unseen enemy when the mercury begins to rise. Unless the whole of the gas which has escaped during the falling of the mercury has been driven out of the mine, it follows that accumulations are forming in every available space, spaces which have probably been officially declared free of gas an hour or two before. It appears most desirable, therefore, that the additional care which is admittedly exercised with decreasing barometric pressure should not in the least degree be relaxed when the mercury is rising; and when pressure is high, special search should be made for any accumulations with a view to dispersing them before they become dangerous. By this means the only gas to be dealt with when the barometer falls would be that escaping from the coal. The Risca disaster of Sunday, January 15, was about the most violent in the year, four men (all in the mine) and 52 horses being killed, and the damage to the workings was very great. Mr. Wilkinson, the manager, at the coroner's inquest, stated: "In the strata, 25 yards above the fall, there was another seam of coal 12ft. or 15ft. thick, in which there would be a large amount of gas constantly generating. That was the only reason he could give for the explosion, but he was not at all satisfied with it. The barometer that evening was unusually high (30·6in. and rising), and might have aided in the causes leading to the explosion." This is perhaps the first time in the history of coal-mining that it has been given in evidence that high barometric pressure had any influence in an explosion. The sooner it becomes more generally recognised that with a high barometer every exertion should be made to prevent accumulations, the sooner may we hope for a great diminution both in the number and violence of colliery explosions.

It is a hopeful sign that the opposition to the warnings evidenced in the first year has given place in the second to an acknowledgment of their value. At the Miners' Conference held at Manchester in August last a resolution was carried "that danger signals ought to be placed in all the great mining centres of the United Kingdom for the purpose of making known such atmospheric changes as may affect the working of mines." One correspondent thinks of the warnings:—"The information respecting the atmospheric pressure in relation to mines is of great value. Unless the miner can be educated up to the standard of mutual preservation and responsibility while at work, no information published will be of any avail in preventing disastrous explosions and calamities." Another correspondent, a mining engineer, taking an interest in the warnings, considers they "are not of the same practical value to colliers, deputies, firemen, or managers, as warnings are to sailors or farmers," through the workmen not often seeing the daily papers. He designed an indicator, showing the changes of the barometer and for noting any predicted dangerous periods, his only object being "to make the warnings sent to the papers of some practical use, which, I am sorry to say, they are not at present, as only a few of the men ever notice them. If colliers could be taught how dependent their safety is on little matters there would be more care shown. The indicator has been in use here some time, and with good results, as the men now regularly notice it." Another asserts that the warnings are being more noticed, and the miners urged to take an interest in them. One correspondent nearly a year ago hoped that success would attend the warnings, but added that at the time his feelings were against them. If in the past two years no other good has been done than to attract the attention of all classes of miners, and induce even the lowest grade to do something more than manual labour in their dangerous vocation, the publication of the warnings will not have been in vain. Without the co-operation of all grades there can be but faint hopes of a reduction in the actual numbers of lives lost annually through explosions, and it is therefore of primary importance to enlist their interest in anything bearing upon their daily work.

It has often been stated that from 1851 the records show that there has been a great reduction in the loss of life, when compared with the number of men employed, being one in 1,008 in the decade ending 1860, and one in 1,817 in the decade ending 1880, but the actual numbers show an increase, 2,441 to 2,656. There is, however, another way of looking at the returns, which show that explosions are becoming more and more violent. The number of explosions show an enormous decrease, being 98 and 99 in 1851 and 1855 respectively, against 16 and 28 in 1879 and 1880. The loss of life per explosion has consequently largely increased, and is still increasing. If we divide the 30 years, 1851 to 1880, into quinquennial periods, the following table shows the number of explosions and the average number of deaths per explosion in each period :—

	1851-55.	56-60.	61-65.	66-70.	71-75.	76-80.	81-82.
Explosions.	464	356	290	275	243	162	59
Average deaths.	2·5	3·6	2·9	5·6	4·0	10·4	6·1

It will be observed that the alternate periods are minima and maxima, but each minimum is higher than the preceding minimum, and the same with the maximum. The last column is for the two years 1881-2, and seems to indicate a higher minimum than that for 1871-5. It is evident from this that attention should now be directed as much towards minimising the violence of explosions as towards reducing their number. It must be a struggle against a ruthless and powerful enemy, but some means must be discovered to overcome, either partially or altogether, the excessive destruction of life and property now going on.

Finally, the responsibility of the colliers in connection with explosions is equal to, if not greater than, that of the officials in charge. Unfortunately, the past year has been fruitful in the conviction of colliers and some overmen for the grossest negligence and recklessness. Some explosions seem to have been entirely due to this craving for breaking the rules. Such cases as hiding matches in the hair, opening lamps with the teeth (for want of keys), or smoking when implored by fellow-workmen to desist, cannot possibly be looked upon as due to thoughtlessness, and the highest penalty of 40s. or two months imprisonment allowed by law is altogether incommensurate with the enormity of the offence. A change of the law in this respect is desirable, and the first to demand it should be the colliers themselves. The offenders are comparatively few in number, and deserve no sympathy from anyone.

FOOD MAKES THE MAN.

SPEAKING roughly, says the *Lancet*, about three fourths, by weight, of the body of man is constituted by the fluid he consumes, and the remaining fourth by the solid material he appropriates. It is therefore no figure of speech to say that food makes the man. We might even put the case in a stronger light and affirm that man *is* his food. It is strictly and literally true, that "A man who drinks beer thinks beer." It cannot obviously be a matter of indifference what a man eats and drinks. He is, in fact, choosing his animal and moral character when he selects his food. It is impossible for him to change his inherited nature, simply because modifications of development occupy more than an individal life, but he can help to make the particular stock to which he belongs more or less beery or fleshy or watery, and so on, by the way he feeds. We know the effect the feeding of animals has on their temper and very natures ; how the dog fed on raw meat and chained up so that he cannot work off the superfluous nitrogenized material by exercise becomes a savage beast, while the same creature fed on bread and milk would be tame as a lamb. The same law of results is applicable to man, and every living organism is propagated "in its kind" with a physical and mental likeness. This is the underlying principle of development. Happily the truth is beginning, though slowly and imperfectly, to find a recognition it has long been denied.

SNAKE BITE—RAPID CURE BY PHENIC ACID.

DR. SEREINS relates a case of snake bite treated successfully by hypodermic injections of phenic acid. The patient, a charwoman, forty years of age, was bitten by a venomous snake on the left foot, just below the external malleolus. Half an hour afterward she experienced an intense smarting at the point of injury, and a sensation of constriction in the abdomen and epigastric region. Soon she began to throw off quantities of glairy mucus and bile. The vomiting was almost incessant, and each attack was preceded by a painful aura starting from the wound, passing up the limb and radiating toward the stomach. A tourniquet was applied to the limb, and the wound covered with a compress dipped in a solution of ammonia. Dr. Sereins arrived two hours after the woman had been bitten, and found her vomiting and suffering from a sense of impending suffocation. The skin was cold and covered with perspiration, the pulse small, feeble, and beating 110 in the minute, On the external surface of the foot just below the malleolus, were two little red points, and above them a small blister caused by the ammonia. The lower part of the leg was enormously swollen, the skin marbled, with here and there yellowish spots and points of ecchymosis surrounded by small vesicles. The patient complained bitterly of cold. Four hypodermics of a solution of phenic acid in glycerine (two in fifteen) were given, one in the neighbourhood of the bite and three at the upper edge of the œdematous part of the leg. The wound was also bathed with the same solution. In one hour there was a very appreciable reduction of the swelling, the vomiting became less persistent, and ceased entirely in four hours. The next day the constricting ligature was removed from the leg. On the second day the patient had entirely recovered, there was but slight swelling of the leg, and the yellow spots and ecchymosis had disappeared. The case seems remarkable in the rapidity of the cure effected. Few accidents of this kind are ever recovered from (if at all) short of a fortnight. Then the woman was not seen until two hours had elapsed after the wound was inflicted. The nervous centres were profoundly affected, as evidenced by the symptoms. Thus the phenic acid not only destroyed the venom at the point of introduction, but even neutralized its effects in the general system.—*L'Union Medicale.*

EFFECTS OF LIQUORS.

CHRAP brandy and absinthe are the cause of a large proportion of cases of insanity in parts of France. The United States Consul at La Rochelle, in his report on French brandies, points out the fact that no pure brandy is now made in Cognac and the district adjacent. He says that German alcohol, distilled from potatoes, is imported, doctored, and sold for brandy, and that the French artisans and peasants, who formerly used light wines, have of late years used much of this so-called brandy. He says : "Its characteristic effect is to produce an intoxication in which the patient is especially inclined to rage and physical violence, while hopeless insanity is the inevitable consequence of persisting in its use, even for a relatively short period of time." It is at least worth the physician's while to know that there is no such thing as pure Cognac now.

A *pump* patented by Mr. David E. Washburn, of Houghton, Mich., dispenses entirely with pistons, plungers, plunger valves, packing, &c., and acts upon the respiratory or bellows principle. Its action is direct and without friction, and the pump, being entirely submerged in water, is proof against all injury from freezing.

RECENT AMERICAN AND FOREIGN PATENTS.

An apparatus for deepening the channels of rivers and removing sand bars where the tides are strong, has been patented by Mr. Gustav Peterson, of Galveston, Texas. The apparatus consists of a rotating drum provided on its periphery with spading devices. The ends of the shaft of the drum are journaled in bearers to each end of which a drag chain is secured. Behind the drum and connected to it by chains is a drag constructed similar to the ordinary square harrow. The apparatus is dragged over the surface to be removed, spading and loosening it, so that it may be removed by the current of the water.

Mr. Henry Webster, of Cassville, Wis., has patented an improved manner of *feeding water to steam boilers*, by which better circulation is obtained. The feed water pipe enters one side of the rear end of the boiler, and passes forward to the front end, thence across it and back part of the length of the boiler, thence again nearly to the front and vertically downwards, terminating just above the bottom of the boiler at the portion over the furnace most highly heated. By discharging the water at this hottest point, the impurities become finely granulated and do not form scale.

An improved *car coupling* has been patented by Mr. Samuel A. V. Hartwell, of Valley Center, Kan. The invention consists in a car coupling constructed with a bar hinged in the interior of the drawhead in such a position that its forward end will rest upon the rear end of the coupling link, and connected by a short bar with a lever hinged beneath the drawhead, and having a crossbar attached to its forward end, so that the link can be controlled from the side of the track.

Improvements in *door latches* have been patented by Mr. John Brownlee, of Evansville, Ind. The latch slides and rotates in the forward end of the case, and in a partition near the rear end, and is held forward by a spring. The knob spindle passes through the case, and a cam block that is operated to move the latch back by turning the knob. Upon the side of the knob spindle are formed teeth, which mesh in teeth formed on the surface of the latch. A pin works against a spiral shoulder in the latch, and by pulling the knob spindle the latch is rotated and moved back.

Mr. Henry C. Keeler, of Council Bluffs, has patented improvements in *lifting jacks*. The frame consists of parallel uprights placed on a support, and provided with slotted plates having notched projections on their edges, with which pendant pawls of a rocking lever engage to raise or lower a standard to which the rocking lever is pivoted. The pawls are held to the notched projections by means of springs attached to the lever. The standard carries the load to be raised.

Mr. Justus M. Silliman, of Easton, Pa., has patented an improved instrument for *projection drawing*. A rectangular frame adapted to rest flat upon a drawing board is provided with graduated scales at its top and bottom edges, and has two quadrant-shaped graduated frames for crystallographic drawing. To the upper side of this frame two wires are attached that pass around a roller reduced at its centre to receive a tension spring that holds the wires taut, so that the upper and lower edges of the drawing frame will be parallel with the winding roller.

Improvements in *baggage checks and clasps* have been patented by Mr. James H. McLeary, of San Antonia, Tex. The check consists of a shell having a circular chamber and an elliptical opening leading to the chamber. A destination plate of elliptical form is adapted to be inserted into the chamber through the opening, and turned to cross the opening, so that a wire that secures the check to the baggage, and passes through the check, also passes through the plate. A duplicate of the destination plate is given to baggage owner.

Mr. Alexander J. Young, of Atlanta, Ga., has patented an attachment for ordinary *hand lanterns* that enables it to be used for giving danger or other signals. A hollow cylinder, in the ends of which a winding shaft is journaled, is secured in an upright position on the frame of the lantern. A screen composed of any suitable translucent material, and of a colour employed to indicate danger, is wound on the shaft, and when it is desired to give a signal the screen is drawn out through a slot in the cylinder and around the body of the lantern.

A *barrel hoop*, having an elastic connection between its ends, by which the hoop may expand when the barrel swells, and contract when it shrinks, has been patented by Mr. Quincy King, of Colorado Springs, Col. The connection consists of a rod of spring metal, bent forward and backward on itself to form a series of loops, and connected at its ends by hooking them through loops in the end of the hoop. Mr. King has also patented an elastic *saddle girth*. Between the strap that connects the girth to the saddle and the girth proper is an elastic section, formed by bending a spring rod or wire in a series of loops, the loops being properly formed for attaching to the girth a strap.

A sanitary *steaming stove* for destroying human parasites, with their eggs and larva, in clothing, and also to disinfect and destroy the germ-spores of infectious diseases, has been patented by Mr. Henry Cartwright, of Portland, Or. Over a surface is placed an evaporating pan, which in turn is covered with a steam-tight casement provided with doors. A rack lining made of wood laths is provided with hooks from which the clothing is suspended. Water is supplied to the pan, and a charge of clothing is steamed for ten or fifteen minutes.

Mr. Elvearo Stout, of Ottumna, Ia., has patented improvements in *refrigerators*. The ice chamber is in the upper part of the case, and the bottom of the chamber is perforated to permit the water from the ice to fall into a pan which forms the top of the provision chamber. The water passes through a series of water spaces that forms the shelves or chambers of the refrigerator, the shelves or spaces being a little inclined so that the water runs across them to vertical spaces that connect them at their ends, and passes out at the bottom of the refrigerator.

Mr. Nathaniel B. Sollers, of Cove Point, Md., has patented a *knitting-board* for manufacturing nets. The board is nearly semicircular in form and is provided with a perforation near its lower end and a block on its under side by which it is steadily held in the hand. A loop holder is secured to the face of the board that is so formed that the loops or meshes are easily placed on it, and will not slip off in use. The net is secured to some stationary object, and the board holds the meshes taut while the shuttle is passed through them.

Simultaneous brake action.—Mr. Edward Ebi, of Cedar Rapids, Ia., has patented an improved device for applying all the brakes of a train simultaneously. The invention consists in a rotating brake rod journaled below the car bottom, and provided at the ends with clutch plates longitudinally movable on the brake rod, whereby the ends of the brake rods will be joined together automatically when the cars are coupled.

An improved *boat detaching apparatus* has been patented by Messrs. Edward J. Hill and Josiah L. Clark, of Westminster, England. This invention consists in constructing the hooks by which the boats are suspended with their upper of curved part swelled into V or horn-shaped lugs provided with downwardly retreating faces, whereby the hooks are prevented from slipping through the rings, links, or shackles, and the latter are held in a forwardly inclined position.

A *railroad signal* has been patented by Mr. A. I. Chaudon, of Titusville, Pa. The invention consists in a spring at the side of the rail, connected with a pawl adapted to act on a ratchet wheel in an underground box or tube parallel with the rails, which ratchet wheel is mounted on a shaft in a longitudinal underground box or tube parallel with the rails, which shaft is connected by means of right angled shafts and bevel cog wheels with one or more vertical shafts journaled in vertical frames carrying bells adapted to be sounded by spring hammers, which vertical frames are a greater or less distance from the spring. Every time a wheel depresses the spring the gongs are sounded, and the approach of the train will thus be signalled at stations bridges, crossings, &c.

Locomotive driving gear has been patented by Mr. William Crippen, of Cadillac, Mich. This invention consists of a crank shaft ranging lengthwise of the locomotive, and located between the trucks and gearing with them by toothed wheels, the crank shaft having universal joints, and also having provision for sliding in the driving pinions on it in order to compensate for the deflections of the line and the variations of the length of the same, due to the curvatures and grades of the road. The crank shaft and transmitting gears are located in the centre of the locomotive to lessen the variations as much as possible. The object is to dispense with the expensive and complicated connecting rod and side bar gear and substitute a cheaper contrivance, and also to lessen the friction of the machinery.

A *wagon rack* has been patented by Mr. John Shafer, of Logansport, Ind. The object of this invention is to provide a wagon bed which may be converted at will into a rack for wood or a rack for hay.

A *sifting screen* has been patented by Mr. Nicholas W. Godfrey, of Bayville, N.Y. This invention relates to improvements in revolving multiple screens, such as are used for separating sand or gravel into different grades, and it provides a revolving multiple screen that can be easily taken apart for repairs or for replacing any of the screens when they become worn out.

A *washing machine* has been patented by Mr. Jonathan E. Hobby, of Omio, Kan. This washer is designed to be placed in a washtub and to be secured to the upper edges or sides. This washer employs a pair of grooved rollers between which the clothes are passed. One of these rollers is provided with a cam to give it end motion to secure a rubbing action.

A *nut lock*, patented by Mr. William P. Miller, of Tipton, Mo., has the plate to which the swinging plate is hinged provided with two spring tongues having guide loops at the ends, between which a hinged joint on the swinging plate passes, this hinge joint being provided with a cam projection, by means of which and the spring tongues the swinging plate can be held in any desired position.

An improved *track lifter* and *holder* has been patented by Mr. Alexander C. Phillips, of New Castle, Pa. This invention relates to means for lifting the rails of railroad tracks, and holding them in position while tamping and filling under crossties, or when taking out old ties and putting in new ones; and it consists in a lever raising device and stand therefor of peculiar construction, and a notched holder for the lever.

A *brick machine* has been patented by Mr. John Owen Smith, of Savannah, Ga. This invention relates to brick machines having a wheel provided with moulds, in combination with eccentrically operated plungers and propellers for feeding the clay to the moulds. The machine will grind the clay as it comes from the bank, feed it into the moulds, and eject them upon boards arranged on a travelling apron, by which they are to be conveyed to the kiln.

A *friction clutch*, patented by Mr. Henry James, of Hudson, N.Y., provides a simple, economical, and effective mechanism whereby driving pulleys or other wheels of machinery may be readily locked upon and released from their shafts while the latter are in motion. The invention consists in the combination with the wheel or pulley, and its wedge-shaped bearing blocks and shaft, of a mechanism that is adapted to move the said bearing blocks longitudinally while the shaft is in motion, and thereby to lock or unlock the pulley upon its shaft.

Cultivator.—Mr. William H. West, of Grand Island, Neb., has patented a cultivating implement which is adapted for several distinct purposes—that is, the preparing of land for grain and the cultivation of corn in all its various stages; and it consists mainly in the special construction of parts by means of which the implement is adapted to cultivate corn two rows at once; and in the combination, with the double cultivator, of a head-block of special construction, by means of which the implement is adapted for preparing land for grain.

MANCHESTER SHIP CANAL BILL.—The provisional Committee of the Manchester Ship Canal Company held a meeting at Manchester on Wednesday to consider the present position of affairs. The chairman, Mr. D. Adamson, reported to the Committee the result of the proceedings before Mr. Examiner Frere. He said the course pursued by the promoters in not depositing plans and sections for the Lower Mersey had been taken deliberately and advisedly and out of regard to the great interests involved in that portion of the river, and it was unanimously resolved to apply to the Standing Orders Committee to dispense with the standing orders and allow the Bill to proceed. The Committee expressed full confidence in the ultimate result of the proceedings.

ALBUMEN IN COWS' MILK.—Dr. Schmidt, Mulheim, has been investigating the nitrogenous bodies in cows' milk, about which so much diversity of opinion has hitherto prevailed. He says that three albuminoid substances are regularly present in the milk, viz.: caseine, albumen, and pepton. The average of seven analyses gave 2·43 per cent. of caseine, 0·38 per cent of albumen, and 0·13 per cent of peptons. Under certain circumstances the amount of albumen may increase until it equals that of the albumen. The pepton is formed from the caseine by a fermentative process; this ferment is destroyed by a boiling temperature, but its activity is not destroyed by salicylic or carbolic acid, so that in this respect it resembles the ferment that digests the albuminoids. Since milk, on long standing may lose 10 per cent or more of its caseine by its conversion into peptons, it should be made use of as fresh as possible when employed for making cheese.

CONSUMPTION OF WATCH GLASSES.—According to the *Revue Chronometrique*, there are annually manufactured 2,500,000 watches, and during the last fifty years more than 70,000,000 have been put on the market; there remains yet for us to add a stock of not less than 50,000,000 of old watches, which makes a total of 86,000,000 to 87,000,000 watches requiring glasses. The new watches consume nearly 4,000,000, which makes an annual consumption of not less than 47,000,000 of glasses. But we must add that every watchmaker away from a town sees the necessity of always having on hand an assortment responding to the wants of his customers. Then if we take into account children's watches, lockets, compasses, &c., one finds one's self with astonishment in the face of an annual consumption which cannot be less than 100,000,000 of glasses.

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